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Maine Certified Seed Potatoes

Green Mountain
Irish Cobbler
Spaulding Rose
Katahdin
Chippewa
Bliss

All stock inspected twice in the field and will be inspected again at shipping time.

Insist on the blue tag for your own protection.

For list of growers address E. L. Newdick, State House, Augusta, Maine.

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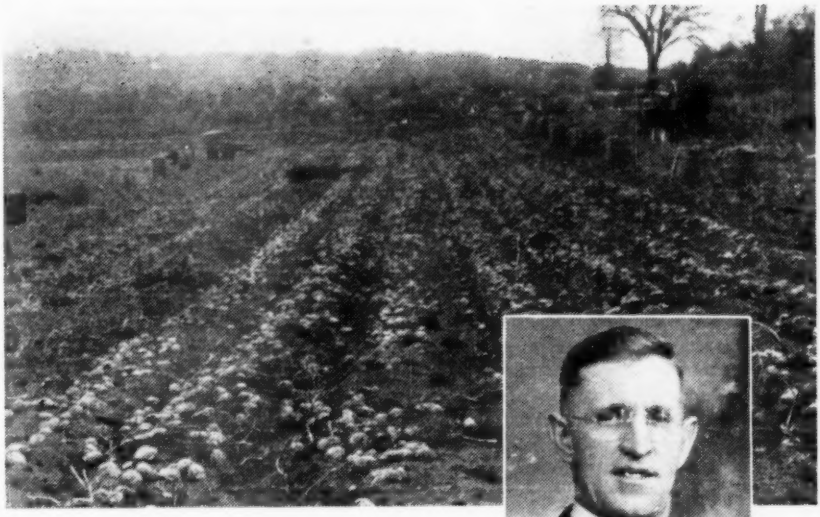

Arthur Price, twice Potato King, Reports for 1936

Armour's Helped Him Raise "Best Quality Ever"

Arthur Price, twice King of New Hampshire Potato Growers, reports on his 1936 results with Armour's Big Crop. Here's his letter:

"Madbury, N. H.
November 14, 1936.

Gentlemen:

On 15 acres (13 Green Mountains, 2 of Cobblers) in 1936, I raised 2,100 barrels of potatoes actual count, not row test measure.

I used Armour's Big Crop 4-8-10, a scant ton to the acre, with twelve spreader loads of manure to the acre.

On one row, 100 feet long, I dug 216 pounds, rows 33 inches apart. I have five reputable witnesses to this count.

The vines stayed up green until frost took them in the latter part of September.

The potatoes were the best quality that I have ever raised in many years of championship raising.

The enclosed pictures will show you how my potatoes looked, just as the digger left them. On a measured acre in the field shown, we dug 178 barrels. The No. 2's ran about one bushel in fifty.

Very truly yours,
ARTHUR PRICE."

Need we say more? Armour's Active Plant Foods, especially balanced for potato growing, have done their work again. Year after year potato growers like Arthur Price stick to Armour's because Armour's gives them dependable results.

Armour Fertilizer Works

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Presque Isle, Me.
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Chicago Heights, Ill.
Sandusky, Ohio
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Armour's BIG CROP FERTILIZERS

ARMOUR'S ACTIVE PLANT FOODS

American Potato Journal

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THE POTATO ASSOCIATION OF AMERICA

SOMERVILLE, N. J. NEW BRUNSWICK, N. J.

THE AIMS OF THE ASSOCIATION

Efforts have been made in the past to organize various national associations on the crop basis but the Potato Association of America is one of the very few which have survived. The original aims of the Association were to create an interest in better seed, to stimulate the development of new and improved varieties, to encourage seed certification, to encourage a more effective system of distribution and marketing, to collect and disseminate the best available information relating to both the practical and scientific phases involved in increased yields coupled with a lower cost.

A brief examination of the many changes in the industry in the past two decades clearly demonstrates that the Association has had these aims definitely in mind. The remarkable improvement in the quality of seed potatoes available for planting is probably one of the most outstanding accomplishments. The support given the plant breeding program by the Association has unquestionably assisted in more rapid progress in the development of new varieties. Marked changes have been made in cultural and storage methods, fertilizers and their use and methods of disease control. The Association, having definitely in mind the original objectives, has embarked on other important activities. The committees on nomenclature, culinary quality, dietetic value, standardization of cooking tests, have undertaken work which will unquestionably prove to be valuable. We need to continue to give thought to the early aims of the Association but we must undertake a program which embraces all phases of the industry.

Leaders in the different states can assist in attaining the important objectives indicated above by becoming members of the Association. Membership brings the American Potato Journal which each month contains articles by the leading investigators who are interested in the potato crop. In addition there are timely reports on crop conditions in the important potato growing areas. Readers of the Journal are certain, therefore, to keep abreast with the new developments in the industry.

American Potato Journal

Volume XIV January, 1937 Number 1

THE DEMAND FOR POTATOES IN URBAN CENTERS

L. F. Garey*

University of Nebraska, Lincoln, Nebraska

The total *per capita* consumption of food is fairly uniform from year to year although there have been some changes in the amounts of different kinds of foods consumed. For example, during the last thirty-five years there have been declines in the amount of flour, corn meal, and beef consumed *per capita,* and increase in dairy products, vegetables, and sugar. In general it may be said that the demand for food as a whole is rather inelastic, but the demand for certain kinds of food may be elastic. The fluctuation in the consumption of staple foods from year to year is less than for those foods that belong in the class of luxuries.

It was the belief that because potatoes are a staple food in the diet and eaten by practically all families, certain facts with respect to demand for potatoes might be discovered, and from such facts principles could be developed which would be beneficial to both producer and consumer. It was also the belief that certain of these principles might be applicable to other similar urban centers. A study of the demand for potatoes in Minneapolis and St. Paul was made in the spring of 1935. Approximately 2,235,000 bushels of potatoes are consumed annually in the Twin Cities. About thirty per cent of these potatoes are shipped in by rail from other states. Some may come in by truck, but it is likely that the consumption of out-of-state potatoes in the Twin Cities does not constitute more than one-third of the total consumption. This raises a pertinent question for the potato producers of Minnesota. Here is a great surplus-potato-producing area, yet consumers buy potatoes raised in other states to the extent of approximately one-third of their total consumption.

*This article was developed from a study made by the author while at the University of Minnesota.

To find some explanation for this situation, the demand for potatoes in the stores and eating places of the Twin Cities was studied during March and April, 1935. Enumerators visited 1,356 retail stores, 20 hotels, 128 restaurants and cafeterias, and 21 hospitals in the Twin Cities and obtained information on potatoes. No information was obtained from stores in the loop district, nor municipal markets of either city, and none directly from consumers. The information was of such character as to portray the demand for potatoes in the Twin Cities. Because of the different purposes served by the sources of information mentioned, the data from each source are analyzed separately.

The quantity of potatoes included in this study constituted about 43 per cent of the consumption in the Twin Cities. The remaining 57 per cent reached the consumers through retail stores in the loop districts, the municipal markets of the two cities, direct purchase from farmers by the resident consumers, and through eating places not included in the study.

The prices quoted are those which were paid at the time the study was made, and may not represent the price for the entire year. The quantities listed cover a year, the estimates being based on the year 1934.

Demand in Retail Stores

Kind and Quantity of Potatoes Sold—Thirteen specified kinds of potatoes were handled by the 1,356 retail stores in this study. Six of these varieties were russets from different states. More Minnesota Russets were sold than any other kind. The Green Mountain ranked second and Washington Russets third. All out-of-state russets amounted to 225,914 bushels, or 26.8 per cent of all potatoes handled. If the Minnesota Russets are included, the quantity of Russets amounted to 400,792 bushels, or 47.5 per cent of all potatoes handled. Of the total quantity sold in 1934, approximately two-thirds were grown in Minnesota.

In this study, stores of five types, from the standpoint of organization, were included. They are the independent, local chain, national chain, cooperative, and local branch. The independent stores were about three times as important as all the other stores combined. There was not much variation in the proportion of different kinds of potatoes handled by the different types of stores except the local chain. This particular chain of stores maintained a warehouse in northern Minnesota and consequently handled a larger proportion of Minnesota potatoes than did any of the other types of stores.

There were four methods of sale followed by the various stores: cash and carry, credit and carry, cash and delivery, and credit and delivery. There was not much variation in the prices among the first three methods of sale but about 6½ cents more was charged for each per peck by the credit and delivery stores which would be an indication of the cost of credit and delivery in this particular type of store.

An effort was made to determine the relationship between the different-sized stores and the proportion of cheap potatoes handled. The number of clerks was used as a measure of the size of the store and all potatoes which sold for less than 25 cents per peck were classed as low-priced potatoes. It was found that the small store handled a larger proportion of low-priced potatoes than the larger stores, the proportion declining as the size of the store increased to approximately a four-clerk size.

Sixty-seven per cent of all potatoes sold were sold by the peck. Each type of store previously mentioned sold about the same proportion on the peck basis. Eleven per cent of the potatoes were sold by the half peck, 20 per cent in five and ten pound quantities, and about two per cent by the bushel. When southern potatoes were on the market approximately 85 per cent of them were sold by the pound.

An effort was made to determine the relationship between income of consumers and the prices paid for potatoes, which would be an indication as to the quality of potatoes purchased. Four income groups in Minneapolis and four in St. Paul were studied, and it was found that as the income of the family increased, a larger proportion of western Russet potatoes were purchased which would indicate that as incomes increased a higher quality of potatoes was purchased, and furthermore that as incomes increased relatively fewer Minnesota Russets were used.

Demand in Eating Places

Kind and Quantity Consumed: The consumption of potatoes in hotels, restaurants and cafeterias and hospitals amounted to twelve per cent of all the potatoes included in the study. There are some differences in the types of demand in these places that should be noted. Hotels, particularly those with a high-class trade, have a demand for potatoes that is quite rigid. Their trade demands a potato that is uniform in both size and quality, and this demand does not vary much throughout the year. The demand in restaurants and cafeterias is less rigid than that in hotels because of a wider range in the class of trade served. This means that a wider range in the size and quality of potatoes may be used. However, there are certain eating places in this

classification that have as rigid a demand for potatoes as do hotels. In hospitals the patients have little opportunity to express their demand for a particular kind of potato or the way in which it is to be cooked; consequently the demand is the least rigid from the standpoint of the trade of any of the three kinds of eating places. The manner in which potatoes in hospitals are to be cooked is prescribed largely by dietitians and is limited almost entirely to baking and boiling. A wider range in both size and quality is possible than in hotels, restaurants, and cafeterias.

TABLE 1.—*Percentage of Russets and other potatoes handled by places indicated*

Source of Information	Russets		Other Potatoes	Total
	Minnesota	Other		
	Per cent	Per cent	Per cent	Per cent
Retail stores	21.1	26.8	52.1	100.0
Hotels	8.6	64.7	26.7	100.0
Restaurants and cafeterias	14.2	39.9	45.9	100.0
Hospitals	3.1	18.0	78.9	100.0

The hotels studied depended on Russets to supply about three-fourths of their trade. The two principal reasons given for using so many Russets were their good cooking quality and uniformity in size. Uniformity in size is extremely important in a hotel because it is usually the custom to serve one potato per person, and because of the necessity of cooking large quantities at a time, good keeping quality after cooking is essential.

Slightly over 54 per cent of all potatoes consumed in restaurants and cafeterias were Russets. Of the Russets consumed, 48 per cent were from the State of Washington, 26 per cent from other western states, and 26 per cent from Minnesota. A smaller proportion came from western states and a larger proportion from Minnesota than was true for the hotel study. The data indicate that the large restaurants and cafeterias—those serving 500 or more meals per day—have a more rigid demand for Russet potatoes than the smaller restaurants and cafeterias, which depend more on other varieties of potatoes grown in

Minnesota. The demand for a potato of a definite size was not so distinct as it was in hotels, but the demand for keeping quality after cooking was about as important.

There was a striking difference in the proportion of different kinds of potatoes used in hospitals and those used in hotels, restaurants, and cafeterias. For example, only 2.4 per cent of all potatoes used in hotels studied were Washington Russets and only 18.0 per cent of all potatoes used were Russets from all western states as compared with 64.7 per cent for hotels and 39.9 per cent for restaurants and cafeterias. A larger proportion of Minnesota potatoes other than Russets was used in hospitals than in either of the other two types of eating places. Hospitals used more mixed potatoes than all the other potatoes combined. They constituted 58.2 per cent of the potatoes used, as compared with 18.6 per cent in hotels and 29.0 per cent in restaurants and cafeterias.

The same measure of size was used in hospitals as in hotels, restaurants and cafeterias, namely, the number of meals served each day. As the size of the hospital increased there was a rapid increase in the proportion of mixed potatoes and a decrease in the proportion of all Russets used. The larger hospitals include the city-supported hospitals in the two cities, in which the patients are not so closely selected as in the smaller hospitals and because of this have no way of expressing as definite a demand for potatoes as is the case with the smaller hospitals.

Cooking.—There were four common methods of cooking potatoes in the three types of eating places just discussed. Potatoes were baked, scalloped, fried, or boiled. Table 2 gives an indication as to the proportion of potatoes cooked by these methods in the three types of eating places.

TABLE 2.—*Method of cooking potatoes in hotels, restaurants and cafeterias and hospitals*

Source of Information	Per Cent				
	Baked	Scalloped	Fried	Boiled	Total
Hotels	23.0	3.4	21.9	51.7	100.0
Restaurants and Cafeterias	4.9	1.5	35.6	58.0	100.0
Hospitals	23.6	1.6	3.6	71.2	100.0

As the size of the hotel increased there was an increase in the proportion of potatoes baked and scalloped. For all hotels, 23 per cent of the potatoes were baked, 3.4 per cent scalloped, 21.9 per cent fried, and 51.7 per cent boiled. The boiled potatoes included mashed potatoes.

As the size of the restaurant and cafeteria increased, there was a continuous decline in the proportion of potatoes served as boiled and a continuous increase in the proportion served as fried. There was no definite trend in the proportion served as baked or scalloped. Fifty-eight per cent were served boiled as compared with 51.7 per cent in hotels; 35.6 per cent were served fried as compared with 21.9 in hotels. One and one-half per cent were served scalloped as compared with 3.4 per cent in hotels, and 4.9 per cent were served baked as compared with 23.0 per cent in hotels. It is evident that the demand for potatoes in restaurants and cafeterias is not so rigid as that in hotels, and for this reason a wider range in both quality and size of potatoes could be used.

There was a striking difference in the proportion of certain kinds of potatoes used in hospitals and those used in hotels, restaurants and cafeterias. For example, only 18 per cent of all the potatoes used were Russets from western states as compared with 64.7 per cent for hotels and 39.9 per cent for restaurants and cafeterias. Minnesota Russets comprised only 3.1 per cent as compared with 8.6 per cent for hotels and 14.2 per cent for restaurants and cafeterias. A larger proportion of Minnesota potatoes other than Russets were used in hospitals than in either of the other two types of eating places. Hospitals used more mixed potatoes than all other potatoes combined. Mixed potatoes constituted 58.2 per cent of all potatoes used in hospitals, 18.6 per cent in hotels, and 29.0 per cent in restaurants and cafeterias. There was a rapid increase in the proportion of mixed potatoes used as the size of the hospitals increased and a decrease in the proportion of Russets. Many of the mixed potatoes were of Minnesota origin.

It is quite evident that hospitals used a lower quality of potatoes on the whole than did either hotels or restaurants and cafeterias. Two reasons may be offered for this. One is that patients in a hospital have little to say concerning their diet and consequently do not specify the kind of potatoes they wish as is done in the other eating places. The other is that many patients of the hospitals, particularly those from rural districts, pay their hospital bills with potatoes. Inasmuch as there is no specification as to quality of potatoes used by hospitals the

potatoes which they take in exchange for their services are likely to be of low grade.

Sources of Purchase

There were four distinct sources from which the retailers purchased their potatoes. Purchases direct from farmers constituted 36.6 per cent of all potatoes handled, from commission firms 33.1 per cent, from warehouses 14.1 per cent, from truckers 4.8 per cent, and from other sources 11.4 per cent. Practically all of the western Russets which were sold through retail stores were purchased directly from commission firms or warehouses. On the other hand only 25.6 per cent of Minnesota Russets were purchased from these sources. Farmers supplied the retail stores with 58.4 per cent of the Minnesota Russets and 2.5 per cent of other Minnesota potatoes. The southern potoes were supplied by either commission firms or warehouses. Table 3 gives the proportion of potatoes purchased from the sources indicated for the three types of eating places discussed. It will be observed from this table that 65 per cent of all potatoes purchased by hotels were purchased from commission firms as compared with 63.2 per cent by restaurants and cafeterias, and 32.3 per cent by hospitals.

Table 3.—*Source of purchase by public eating places*

Source of Information	Per Cent				
	Com. Firms	Farms	Re-tailers	Other	Total
Hotels	65.1	10.5	1.2	23.2	100.0
Restaurants and Cafeterias	63.2	28.3	1.8	6.7	100.0
Hospitals	32.3	60.0	3.4	4.3	100.0

In some cases hotels used potatoes from their own farms. Restaurants and cafeterias purchased 28.3 per cent of their potatoes from farmers as compared with 10.5 per cent purchased by hotels and 60.0 per cent purchased by hospitals. As in the case of the hotel there is a rather significant demand for certain kinds of potatoes in restaurants and cafeterias, although the demand is not quite so rigid as in the case of hotels. Hospitals purchase their potatoes from two sources mainly. Sixty per cent of their purchases were from farmers and

32.3 per cent were from commission firms. The reason for the large proportion purchased from farmers has already been mentioned.

We now come to the question as to why practically one-third of the potatoes consumed in the Twin Cities were grown outside of the state, which produces a surplus.

Several objections were raised to the potatoes grown in Minnesota, by the various agencies studied. These reasons may be classified under six heads. (1) Poor cooking and baking qualities and turning black after cooking. Turning black was the one most frequently mentioned. This objection was especially common from large hotels, restaurants and cafeterias where it was necessary to cook large quantities at a time because of the long period of service necessary in these eating places. (2) Diseases, including scab and both hollow and dry rot. Hollow rot was frequently mentioned. (3) Poor quality, including softness, starchiness, wateriness, and general lack of quality. (4) Lack of uniformity in size, color, and roughness. Under this objection the matter of ungraded potatoes was frequently mentioned. (5) Wastefulness, including waste of all kinds in preparation for cooking. (6) Poor keeping qualities before cooking.

It is entirely possible that the importance of some of these objections could be decreased by greater care and skill in handling the potatoes after they reach the agencies discussed in this article. Furthermore, they might be reduced by greater skill and care in growing the potato crop.

Some favorable comments were obtained on Minnesota potatoes. The comments most frequently mentioned were quality and flavor in the northern-grown potatoes. In certain retail stores favorable comment was obtained with respect to the cheapness of Minnesota potatoes, because it enabled retailers in certain districts to provide an outlet for a rather large quantity of cheap potatoes.

Conclusions

This study would indicate that in metropolitan areas there is a rather steady demand for a good quality of potatoes. This is particularly true in large public eating places. There are two outstanding requirements on the part of consumers for potatoes, uniformity in size and satisfactory cooking qualities. Premiums are paid for potatoes possessing these two qualities and inasmuch as potatoes constitute a small proportion of the total meal cost, operators of public eating places seem ready and willing to pay good prices for good potatoes. It

would seem that, inasmuch as a large proportion of potatoes consumed in the Twin Cities comes from outside sources, the Minnesota potato crop which is available to consumers in the Twin Cities does not possess these two qualities to the extent desired.

Ninety per cent of the potatoes shipped from Minnesota go to twenty cities located largely in the southeast. These potatoes must compete with Wisconsin and Michigan-grown potatoes and because of greater distance the Minnesota potatoes are at some disadvantage. In an attempt to meet this competition, the best of the potatoes are shipped out the state. The competition can be more nearly met by marketing a better product.

About 50 per cent of the objections mentioned were disease, poor quality, and lack of uniformity. Certainly some of the objections to diseased tubers and poor quality can be overcome through more careful cultural practices such as treatment of seed and selection of soil on which potatoes are grown. Greater uniformity can be secured by more rigid grading. Uniformity has a strong appeal to consumers and therefore they are willing to pay more for a uniform, reliable product than for one about which there is some doubt.

THE VALUE OF COVER CROPS IN POTATO PRODUCTION IN EASTERN VIRGINIA

JACKSON B. HESTER

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In the management of a highly specialized crop such as potatoes, the basic factors underlying its production are important. When the price level is high because of a low average crop yield resulting from unfavorable climatic conditions, an increased yield due to keen soil management means additional profits. Again, in order to make profits continuously, a large yield of quality potatoes must be economically produced. The importance of maintaining a high soil organic matter content is perhaps not surpassed by any other crop. The use of cover crops is an effective way to maintain the soil organic matter content.

COVER CROPS AND POTATO PRODUCTION

Work has been conducted for the past four years to answer the question of what type of rotation to follow and what type of crops

to plant in this rotation. A fairly poor soil was selected on which to conduct the tests and consequently the results for the first three years were somewhat discouraging. These results are summarized in table 1.

TABLE 1.—*Influence of cover crops on the yield of potatoes**

Crop	Three-year average for 1933-'34-'35		
	Nitrate Nitrogen in Soil before Planting	Bushels Primes Per Acre	Per Cent Increase
	p. p. m.		
Cash crop	1.91	139	—
Cut for hay	3.53	154	11
Non-legume	1.60	163	17
Non-legume plus nitrogen	2.27	164	18
Mixture	3.42	155	12
Legume	4.48	163	17

*A crop of potatoes grown each year and followed by the cover crop instead of a cash crop.
Standard fertilizer: 1 ton 6-6-5 per acre.
Cash crop received additional fertilizer, 1,000 pounds per acre.

Each year a crop of Irish potatoes was grown on a Norfolk sandy loam and followed by several different cropping systems. The following types of rotation were carried out: (1) Continuous cash crop such as kale or collards; (2) Continuous cash crop with Dismal Swamp peat added in an amount equal in humus to that of a cover crop (not shown in table); (3) Soybeans with tops removed for hay; (4) Sorghum; (5) Sorghum with nitrogen added; (6) Mixture of soybeans and sorghum; (7) Soybeans. Therefore, each rotation included two crops each year.

The results for the individual years have brought out some rather interesting facts. Since each of the treatments received a ton of 6-6-5 (N-P-K) fertilizer to the acre each year for the potato crop, the question of the nitrogen from the legume and non-legume has been interesting. During dry years when leaching of nitrogen has not been a factor the non-legume has yielded the greatest increase. When leaching has been a factor the legume and non-legume plus

FIGURE 1.—*The illustration shown above represents the average yield of potatoes from five plats in each rotation. The rotation represents potatoes preceding the following crops:* (1) *Continuous cash crop;* (2)*Continuous cash crop with Dismal Swamp peat;* (3) *Sorghum;* (4) *Sorghum plus nitrogen;* (5) *Soybeans and sorghum;* (6) *Soybeans.*

additional nitrogen have given the greater returns. The yields are low because the climatic conditions for the three years have been rather unfavorable and the soil is not particularly well suited to potatoes. The nitrate nitrogen is given merely to show that the various treatments had influenced the available nitrogen in the soil before the fertilizer was applied.

THE YIELD AND COMPOSITION OF COVER CROPS

The figures in table 2 show the average yield of the cover crops for three years and the plant nutrients involved in their growth. Sorghum has yielded the greatest top growth and extracted the greatest amount of plant nutrients, other than calcium, from the soil.

TABLE 2.—*Plant nutrients absorbed by cover crop*

Crops*	Pounds per Acre					
	Average Yield	Nitrogen	CaO	MgO	K_2O	P_2O_5
Sorghum	8331	146	58	47	106	47
Soybeans	5187	184	110	45	85	34
Mixture	6756	186	95	49	99	42

*Three-year average.

It is further shown that each year the soybean crop apparently fixed from the air about forty pounds of nitrogen to the acre which was returned to the soil. The fact that the harvested portion of these crops contained more phosphorus than is utilized by a crop of potatoes should mean that cover crops greatly increase the availability of this element. With this in mind, it is interesting to examine the results for potatoes the fourth year of this rotation.

RESULTS OF FOURTH YEAR OF ROTATION

The total yield for the fourth year is rather low because of too much rain in the early part of the season and extreme drought at the end. But the high price of the crop has made the increase in yield due to soil management, worth while. The results given in table 3

TABLE 3.—*The value of cover crops in the potato rotation*

Rotation	Yield* in Bushels per Acre	Per Cent Increase in Yield
Continuous cash crop	106	—
Same with Dismal Swamp peat	140	32
Soybeans cut for hay	115	8
Sorghum	183	73
Sorghum plus nitrogen	193	82
Sorghum and soybeans	198	87
Soybeans	203	92

*Results for the spring of 1936.

and figure I hardly need any explanation. The fact that the peat gave somewhat lower yields than the cover crops may be explained on the basis that more plant nutrients were returned to the soil by the cover crops, as is shown in table 2. Soybeans gave the greatest yield probably because of the fact that heavy rains in the early part of the season leached much of the available nitrogen. Although forty pounds of nitrogen were added to the sorghum plus-nitrogen plat (on acre basis), it was not so thoroughly incorporated with the organic matter.

The reaction of the soil was maintained between pH 5.0 and 5.5 during the growing season with dolomitic lime. This made the conditions ideal from the standpoint of soil reaction and precluded any magnesium deficiency on all plats. Since the returns from cover crops have been so great in this experiment a discussion of the value of organic matter in the soil may prove of interest.

Soil Colloid Composition and Aluminum Solubility

It has been known for some time that soluble aluminum in relatively large quantities in the soil is toxic to plant growth. Further, it has been known that aluminum goes into solution in different soils at different pH values, depending upon the soil type and composition of the soil colloid. Soils developed under humid, warm climates are known to have more aluminum and iron in proportion to silica in the colloid and to give aluminum in solution at a higher pH value than soils with a wider ratio. Humus in the soil colloidal complex acts in a manner similar to silica and consequently soils with a high organic matter content will grow crops at a lower pH value than similar soils with a low organic matter content. These two factors are brought out in table 4.

The Portsmouth soil series belongs to the dark-colored and poorly-drained group of soils which are characterized by a high organic matter content. It is shown in the data given in table 4 that rather large quantities of aluminum came into solution at pH 4.1 in the Portsmouth soil and collards failed to grow, while at pH 5.6 no aluminum appeared in the drainage water and crops grew well. Similarly, for the Bladen soil even a larger quantity of aluminum appeared in the drainage water at pH 4.2 but none at 5.7. The Bladen soil belongs to the poorly-drained and light-colored soils. In addition to having a medium amount of organic matter it has a rather broad silica/alumina ratio which prevents the aluminum from coming into

TABLE 4.—*The influence of soil acidity and soil colloidal composition upon the solubility of aluminum and yield of collards*

Per Cent Base* Saturation	pH	Al_2O_3** Leached	Yield*** Grams
Portsmouth loamy fine sand—13.5 per cent organic matter			
10	4.1	178.9	3.1
41	5.6	0.0	34.4
74	6.0	0.0	35.6
97	6.9	0.0	31.3
Bladen sandy loam—1.8 per cent organic matter			
15	4.2	184.2	1.0
47	5.7	0.0	13.3
62	6.4	0.0	14.8
80	6.8	0.0	21.4
Norfolk fine sand—1.0 per cent organic matter			
28	5.2	874.9	0.2
37	5.5	6.4	3.2
48	5.8	2.9	13.5
81	6.5	0.0	17.1

*Per cent of the total base-holding power of the soil.
**Milligrams per 1000 grams soil appearing in the drainage water at the end of the experiment. Soil leached with the equivalent of two inches of rainfall.
***Dry weight per pot—8 kilograms soil.

solution under moderately acid conditions. On the other hand the Norfolk fine sand, a soil belonging to the light-colored and well-drained soils, or the highly trucked soils, gave a rather large quantity of aluminum in the drainage water at pH 5.5 and plants failed to grow. This was caused by the narrow ratio of aluminum and iron to silica in the soil colloid and the low organic matter content. This point is perhaps more clearly brought out in the following paragraphs.

SOIL ORGANIC MATTER AND ALUMINUM SOLUBILITY

Data given in table 5 show the influence of organic matter, added to the Bladen and Norfolk soil, upon the solubility of aluminum at

TABLE 5.—*The influence of organic matter upon the solubility of aluminum and the yield of collards in acid soils*

Per Cent Organic Matter*	Al_2O_3** Leached	Yield*** Grams
Bladen sandy loam—pH 4.2		
1.8	184.2	1.0
2.8	0.5	3.7
3.8	0.2	9.1
5.8	0.0	11.5
Norfolk fine sand—pH 5.0		
1.0	874.9	0.2
2.0	3.5	3.2
3.0	0.4	7.2
5.0	0.2	12.3

*Increase in organic matter from peat moss with an initial pH value of 3.8 and 0.7 per cent nitrogen.
**Milligrams per 1000 grams soil leached by two inches of water applied at the time of harvest of the crop.
***Grams of dry weight per 8 kilograms soil.

low pH values. At pH 4.2 there was too much aluminum in solution for plants to grow satisfactorily but when the organic matter was increased to 5.8 per cent with peat moss, plants grew satisfactorily, and no aluminum appeared in the drainage water. The peat moss was very low in plant nutrients analyzing pH 3.8 and 0.7 per cent nitrogen. Again, with the Norfolk soil it is noted that only relatively small amounts of aluminum appeared in the drainage water at 5 per cent organic matter and plants grew well at pH 5.0; whereas, no growth was made in the normal soil at pH 5.2. Toxicity from aluminum is not the only unfavorable condition accompanying extremely acid soil reaction or low organic matter content.

Data given in table 6 show that as the soil becomes acid the calcium supply of the soil greatly decreases, the aluminum appears in solution, and phosphorus becomes unavailable. Consequently the unfavorable conditions occurring in the soil when aluminum appears in solution cannot altogether be attributed to aluminum toxicity. However, a test for aluminum is a signal of danger. Where aluminum appears in solution in the potato soils, plants fail to make normal

TABLE 6.—*The influence of replaceable calcium upon the solubility of aluminum and phosphorus and the yield of potatoes*

(Norfolk sandy loam—2.2 per cent organic matter)

pH	Water Soluble*		Replaceable* CaO	Yield** in Bushels per Acre
	Al_2O_3	P_2O_5		
4.5	3.5	0.3	238	11
4.9	1.6	0.9	294	34
5.4	0.3	1.6	420	53
5.8	0.0	2.3	651	66
6.1	0.0	2.5	791	80
6.5	0.0	3.3	840	77
7.0	0.0	4.8	889	70

*Parts per million in soil.
**The low yield of prime potatoes was due to extremely dry weather.

growth. The yields shown in table 6 are exceedingly small because of a very unfavorable year but with the accompanying data serve to illustrate the influence of low soil reaction upon the yield of potatoes. Table 7 further brings out this point; this test was conducted in a

TABLE 7.—*The influence of lime upon the yield of potatoes and the solubility of aluminum*

(Sassafras sandy loam—2.8 per cent organic matter)

Treatment	pH	Al_2O_3 in Soil	Bushels per Acre
		p. p. m.	
No lime	4.4	1.8	258
2000 pounds lime*	4.9	0.5	347

*Over a period of three years.

much more fertile soil under very favorable climatic conditions. Here again it is noted that only 1.8 parts per million of aluminum oxide appeared in solution at pH 4.4; whereas, 3.5 p. p. m. appeared in solution at pH 4.5 in the soil with a lesser quantity of organic matter. The soil with the lower organic matter content likewise had a lesser supply of available calcium and magnesium.

Soil Organic Matter and Phosphate Availability

The above data serve to show the influence of soil reaction upon the solubility of phosphorus. However, for potatoes the soil should be moderately acid, below pH 5.5, to prevent severe injury from the potato scab organism. The availability of phosphorus greatly decreases below pH 5.5 in a soil low in organic matter. This can be illustrated by the fact that each year a grower applies much more phosphorus than is actually utilized by the crop. The grower in eastern Virginia normally uses one hundred and twenty pounds of phosphorus each year in growing a crop of potatoes. Not over thirty pounds of phosphorus are utilized by the crop and even much less than that quantity is removed from the soil. The fixation of phosphorus in a difficultly available state, then, is very great. Organic matter greatly increases the availability of phosphorus in the soil and is very essential where the soil must be kept acid for the economical production of a crop. For example, a Norfolk fine sand, with a low organic matter content, was selected to determine the influence of organic matter upon the availability of phosphorus. The organic matter content of the soil was increased with peat moss and the phosphate content with superphosphate. Therefore, it is indicated in table 8 that the crop of lima beans

Table 8.—*The influence of organic matter upon the availability of phosphorus and growth of Lima Beans in Norfolk fine sand*

P_2O_5* in Soil	Yield**	P_2O_5*** Absorbed
1 per cent organic matter		
2560	3.3	7.3
4056	4.1	13.7
5544	7.2	21.4
8544	14.7	43.7
14432	38.6	133.6
3 per cent organic matter****		
3008	13.7	37.3
4448	32.7	97.1
5952	33.5	91.1
8936	33.6	103.8

*Total milligrams P_2O_5 in 8 kilograms soil.
**Grams of dry weight per 8 kilograms soil.
***Milligrams P_2O_5 absorbed per 8 kilograms soil.
****Increase in organic matter from peat moss.

responded to a very large application of phosphorus; whereas, a similar yield was obtained with less than a third of the amount of phosphorus when the organic matter content of the soil was higher. Indeed very little further response was received for the additional phosphorus where the organic matter content was three per cent. These data are in keeping with the trucking soils around Norfolk. Many of the old trucking soils low in organic matter carry as much as ten times the original supply of phosphorus in the top six inches of earth and still crops respond to phosphate application on these soils.

The Water Holding Capacity of Organic Matter

In addition to the increased availability of all plant nutrients, particularly phosphorus and nitrogen, the water holding capacity of organic matter should be mentioned. The organic matter of the soil has about four times the water holding capacity of clay and eight times that of a sandy soil. Therefore the additional water holding capacity of a soil rich in organic matter adds this advantage during dry years. From the above discussion it is shown that in the production of potatoes it is important to have the soil well supplied with organic matter.

Determining Soils Unsuited for Potatoes

A soil is unsuited for the economical production of potatoes when the organic matter content is so low that aluminum appears in solution at a pH value above that which is unsafe to lime on account of the scab organism. A system of soil testing has been developed by which these tests may be made rather quickly. Some of this information is given in bulletin 82 of the Virginia Truck Experiment Station and in mimeographed supplements. Temporarily we have set the lower limits for the Norfolk types of soil at 1.5 per cent organic matter and perhaps it would be wise to limit it to 2.0 per cent.

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*No effort is made to review or cite literature on the subject in this paper but many references will be found in the above bulletins.

RECLAMATION OF POTATO LAND FLOODED BY SALT WATER

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There are certain well-known areas in the Middle Atlantic States where the primary crop grown is potatoes and the commercial production of this crop has been followed for a long time. Many of the farms in these areas are located on or near the coast and often some of the most productive fields lie below sea-level. Because of this fact, land of this type is always in danger of being flooded by salt water whenever strong winds and high tides combine to create flood conditions. Within the past three years several floods of this kind have occurred and it seems desirable to record some of the details concerning two of them, especially with regard to the effects of flooding on the subsequent potato crops.

Salt Water Flooding in Virginia

The first flooding to be discussed occurred on August 23, 1933, on the Eastern Shore in a section generally known as the Tidewater Section of Virginia. Salt water remained on some of the fields from 3 to 5 hours. During and directly following the flood, heavy tropical rains washed away much of the salt water either by surface run-off or by leaching. In general, though, the more heavily flooded fields were salted sufficiently to kill all vegetation.

Less than a month after the flooding occurred, salt crystals began to appear on the surface of numerous fields. Rumor spread that the flooded land might not raise a crop for several years and this fact naturally caused considerable anxiety among the farmers. At this point the Division of Soil Fertility Investigations, Bureau of Plant Industry, U. S. D. A., undertook an investigation of the situation in cooperation with the Virginia Truck Experiment Station.

Soil samples were taken from the flooded fields at three depths; 0-6 inches, 6-12 inches, and 12 to 24 inches, and the salt content of the samples was determined by an electrical bridge using, at first, the soil itself. Later it was found more convenient to make the determinations on water extracts of the soil samples.

As might be expected there was a wide range in the salt content of the surface soil which was caused largely by the conditions of flooding. The highest salt concentration in the surface soil was 0.7 per cent but for the majority of fields it was 0.2 per cent. In a few instances there was a higher salt content at lower depths but in the main at this stage most of the salt was at or near the surface.

Recommendations to Growers

Deep plowing was recommended where the salt was highest at the surface but only light discing where most of the salt was held at lower depths. Farmers were advised to sow rye or barley where there was less than 0.2 per cent salt in the surface soil, and whether seeded or not, generous applications of manure, pine shatters, or straw composts were recommended. Lime or gypsum was suggested hoping to offset the toxicity of sodium ions and at the same time improve the physical condition by preventing puddling.

Greenhouse Study on Virginia Soil

Early in December 1933 a greenhouse experiment was conducted on potato soil from the Eastern Shore of Virginia for the purpose of getting some advance knowledge regarding the limits of tolerance of potatoes for salt. The illustration shows the condition of plants from Irish Cobbler seed approximately two months after planting. Fertilizer was applied at the rate of 2000 pounds to the acre in addition to the amounts of salt designated, the salt being thoroughly mixed with the bulk of soil.

It will be noticed that growth of plants and tubers was affected when the salt content of the soil reached 1000 parts per million (0.1 per cent). At 2000 parts per million of salt (0.2 per cent) no tubers were formed at the time the photograph was taken and it will be further noticed that several eyes on the seed-piece had started growth, indicating a disturbed apical dominance. In the field, good crops were produced where the salt in early spring amounted to 1500 parts per million (0.15 per cent) but it is very probable that this amount was materially lessened by planting time, making it possible to produce a normal crop with manure and a lower amount of fertilizer.

Effects on Potato Crop

When sampled again early in the spring of 1934, much of the salt had been leached from the surface soil of the Virginia fields causing an increase at lower depths in a few fields but for the most

part both surface soil and subsoil appeared safe for potatoes, provided drought conditions did not cause accumulation of the salt at or near the surface.

During the following season every flooded field visited that was planted to potatoes, produced a normal crop. In some instances the normal fertilizer application of 2000 pounds to the acre was reduced to 1800 or 1500 pounds but this reduction may not have been necessary. The important factor was, that heavy rains occurred shortly after planting followed by normal rainfall during the growing season. Three years have elapsed since this flood occurred and no ill effects have been reported in any of the affected areas.

Recent Flooding on Long Island

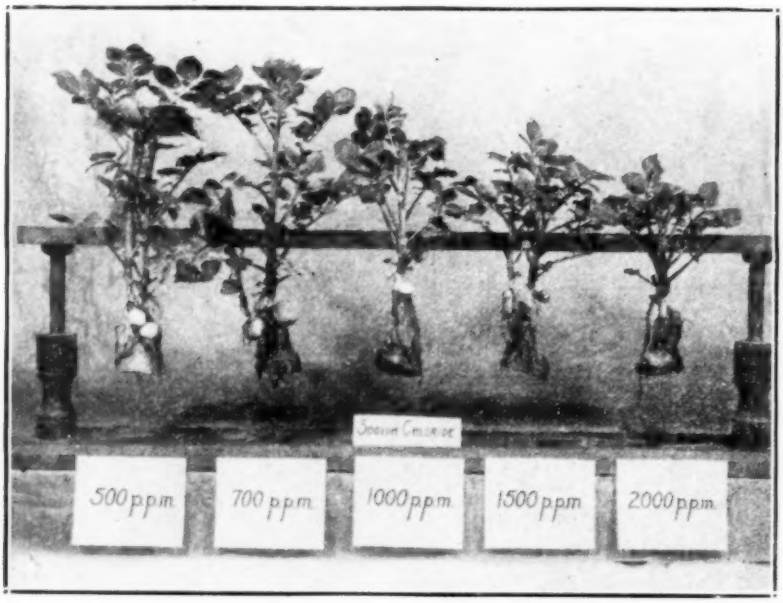
Late last November a similar type of flooding occurred in the Orient Section of Long Island inundating a considerable acreage of potato land with salt water. This more recent Long Island situation was handled in much the same manner as the previous flood in Virginia, except that the soil samples in this case were taken with the cooperation of the Suffolk County Farm Bureau.

Although the flooding on Long Island was reported not to be so severe as that in Virginia three years ago, nevertheless an analysis of the soil indicated a much greater penetration of salt. Many of the fields were uniformly high in salt to a depth of twelve inches as indicated by the samples taken about a month after flooding.

Rise of Salt During Drought

When sampled again in early spring, there was distinct evidence that much of the salt had been leached from the surface soil to lower depths. There was every reason to believe that the recommendations suggested to the farmers were helpful in reclaiming the salted land. However, during the early part of this growing season the exceptionally dry weather caused damage from rise of salts on some of the flooded fields. In June on certain portions of a number of the flooded fields the potatoes were stunted, yellowish green in color, and the leaves distinctly curled and brittle. On one affected field salt was in evidence between the rows and on the sides of the ridges causing a blackened crust, in appearance much like the black alkali soils of the West but without carbonates. The surface soil of this particular field contained slightly over 1300 parts per million of salt (0.13 per cent) but although this amount may not be excessive for potatoes under some field conditions, still in this case there

was distinct injury. There were also indications that the water table had been raised causing a much higher concentration of salt at lower depths undoubtedly in contact with the roots and probably causing most of the trouble.



The effects of various amounts of sodium chloride on the yearly growth and tuber formation of potatoes

Summary

From the two flood situations discussed, the information compiled leads to the conclusion that potatoes may be grown successfully on land flooded with salt water if the salt content is below 1000 parts per million (0.10 per cent) at time of planting and normal rainfall occurs throughout the season. The recommendations for reclamation have also demonstrated their value in helping to bring back normal conditions. It may be pointed out also that the electrical bridge has proved its usefulness in an emergency of this kind where rapid rather than highly accurate results are desired. It may be further pointed out that although a potato crop may be grown on land that has been salted below the limits stated, yet it is possible that the quality may be impaired, but no evidence of such an effect has been reported.

DEVELOPMENT OF THE CERTIFIED SEED "POTATO-EYE" TRADE[1]

J. W. SCANNELL

District Inspector, Indian Head, Saskatchewan, Canada

The seed potato-eye trade is not new in the Prairie Provinces of Canada. According to local information, this trade started about twenty-five years ago, and the pioneer firm in this business writes as follows: "Conditions were quite different then to what they are now. Settlers were moving in to all parts of Western Canada and many of them were a good many miles from railways. Good seed potatoes were not obtainable easily or except at a very high cost. By cutting potato eyes and mailing them we made good seed available to settlers in all parts of the country." Its development in recent years has been due to the introduction of cheap postal rates, of air mail services, and to the better results obtained from the present practice of cutting the eyes only from certified seed only. As the name indicates, the eyes are sold, and they are cut from the tuber by the following methods:

(1) An instrument resembling an apple corer.

The corer is placed over the eye and pushed through the tuber making a cylindrically shaped set with an eye at one end, or on chance occasions, an eye at both ends. The borer is an inch in diameter and the length of the set is governed by the size of the tuber. In 1935 ten eyes cut in this manner from a commercial lot weighed six and one-half ounces.

(2) A potato parer bent into a semi-circle.

This method produces sets of a conical shape that are much smaller than those produced by the other two methods. Ten sets cut in this manner in the spring of 1935 weighed two ounces.

(3) A vegetable baller.

This produces the most uniform set. A vegetable baller is a kitchen utensil used by housewives for shaping vegetables into balls for decorative cookery. The eyes are cut from the tuber in semi-circular form, approximately an inch in diameter and an inch across at the deepest point. Large or small tubers give sets of uniform size. Ten sets weighed four ounces. This

[1]Contribution No. 472 from the Division of Botany, Experimental Farms Branch, Department of Agriculture, Ottawa, Canada.

method was first used by J. W. Marritt, District Inspector, Seed Potato Certification for Alberta.

The sets are thoroughly coated with slaked lime or whiting to prevent drying out and shrinking, and can then be kept for several weeks without any apparent deterioration. Later, they are boxed or rolled in oiled paper for shipment. It is estimated that in the spring of 1936 there were more than half a million eyes sold in Western Canada. It has been found that by using the Number 3 method of cutting eyes, a bushel of Irish Cobblers will give about 1000 eyes and a bushel of Early Ohios about 1300 eyes. After all the salable eyes have been removed the remainder of the tuber is used for planting for the production of table stock or for feeding to live-stock.

TABLE 1.—*Seed potato eye test* 1935

Lot	Variety	Weight of 10 Eyes	Yield in Bushels per Acre			Culls
			Marketable	Culls	Total	
						Per Cent
1	E. Ohio	6½ oz.	422	87	509	15
	I. Cobbler	6½ oz.	560	115	675	17
	Bovee	6½ oz.	375	93	468	20
2	E. Ohio	2 oz.	322	53	375	14
	I. Cobbler	2 oz.	366	61	427	14
	Bovee	2 oz.	316	93	408	22
3	E. Ohio	4 oz.	344	75	419	15
	I. Cobbler	4 oz.	253	68	321	21

1. Samples received May 11th and weighed May 13th. 50 sets planted May 14th and harvested September 18th.
2. All samples were coated with slaked lime or similar substances.

Although the handling of certified seed in the form of eyes is especially adapted to isolated points served only by air mail or rural mail delivery, it is by no means confined to these districts. Any district remote from a seed house is conveniently served in this way, and seed houses frequently despatch by mail, garden seeds and potato-eyes together. Delivery charges are included in the list price of eyes, but not in the list price of ordinary seed potatoes. Eyes have been selling at approximately a dollar for each hundred, delivered, depending on the variety, whereas potatoes were selling at approximately a dollar for each bushel, delivery charges extra. In many

cases the freight or express charges on ordinary seed would be as great if not greater than the charge for the seed itself, although in the mining areas served by aeroplane service only, freight would cost many dollars for each bushel.

TABLE 2.—*Seed potato eye test* 1936

Lot	Variety	Germination	Yield in Bushels per Acre			Culls
			Marketable	Culls	Total	
		Per Cent				Per Cent
1	Warba	72	132½	24	156½	15
	Gold Nugget (Q)	36	61	11	72	15
	E. Ohio	94	169	29½	198½	15
2	E. Ohio	54	91½	16	107½	15
	Warba	40	86	9	95	9
	Bovee	12	28	5	33	15
3	I. Cobbler	100	166	19¾	185¾	10
	Lady Llewellyn	84	86½	41½	128	32
	E. Ohio	64	93	25	118	21
	Warba	86	130	24	154	15
	Bovee	90	164	21	185	11
*4	E. Ohio	90	127	19	146	13
	I. Cobbler	80	167	14	181	8
**Check	E. Ohio	86	130	29	159	18
	I. Cobbler	98	133	44½	177½	25

*A lot cut by the third method described above, except that sets were planted immediately upon cutting and were not coated with lime.

**Check—consisted of sets cut with a knife; tubers had two or three eyes in each set. They were cut and planted immediately without being coated with lime.

The results that growers have obtained by using seed potato-eyes have been very satisfactory. One grower living approximately 1000 miles from the seedhouse with which he did business, states that he planted 32 eyes on June 9th, 31 grew and on September 7th he harvested 69 lbs. of good-sized potatoes. This was during one of the drought years. In 1935 experiments conducted in the Winnipeg area of Manitoba, gave yields of 203 bushels of Early Ohios to 258 bushels of Irish Cobbler to the acre. Within a period of four years, another grower produced a carload of potatoes from an original purchase of 25 eyes. Yields obtained during the past two years at the Dominion Experimental Farm at Indian Head, Saskatchewan are shown in tables 1 and 2.

REPORT OF THE TWENTY-THIRD ANNUAL MEETING OF THE POTATO ASSOCIATION OF AMERICA

The Potato Association of America held its 23rd Annual Meeting at Atlantic City, New Jersey, from December 29 to 31, inclusive. Sessions were held in the Municipal Auditorium. The program was well arranged and included a number of papers of interest and value. With few exceptions these papers will be published in future issues of the American Potato Journal. There were fifty-six papers and reports presented during the five sessions, including joint sessions held with the American Society for Horticultural Science and the American Phytopathological Society. The attendance at all sessions was larger than for a number of years.

Officers and Committees for 1937

President, Fred H. Bateman, York, Pa.

Vice-President, F. A. Krantz, University of Minnesota, St. Paul, Minn.

Secretary-Treasurer-Editor, Wm. H. Martin, Agricultural Experiment Station, New Brunswick, N. J.

Executive Committee: Julian C. Miller, Louisiana State University; Ora Smith, Cornell University; Frank W. Hussey, Presque Isle; C. H. Metzger, Colorado State College.

Committee on Potato Consumption and Dietetic Value: E. V. Hardenburg, Cornell University; H. H. Bakken, University of Wisconsin; C. H. Metzger, Colorado State College.

Committee on Standardization of Cooking Tests: E. J. Wheeler, Michigan State College; E. V. Hardenburg, Cornell University; A. T. Erwin, Iowa State College; Marion D. Sweetman, University of Maine; Florence King, Dept. of Agriculture, Washington, D. C.

Committee on Standardization of Field Plot Technique: J. R. Livermore, Cornell University; H. O. Werner, University of Nebraska.

Committee on Nomenclature: William Stuart, Washington, D. C.; C. L. Young, Frederickton, Canada; C. H. Metzger, Colorado State College; J. C. Miller, Louisiana State University; C. F. Clark, U.S.D.A.

Committee on Certification: Karl Fernow, Cornell University; E. M. Gillig, North Dakota Dept. of Agr.; A. G. Tolaas, Minn. Dept. of Agr.; J. C. Miller, Louisiana State University; H. O. Werner,

University of Nebraska; E. L. Newdick, Maine Dept. of Agr.; J. L. Budreau, Savannah, Ga.; R. R. Pailthorp, U. S. Department of Agriculture; Wm. H. Martin, N. J. Agr. Exp. Station.

Committee for Review of Potato Literature: Ora Smith, Cornell University.

Potato Improvement Committee: Julian C. Miller, Louisiana State University; J. R. Livermore, Cornell University; F. M. Harrington, Montana State College; R. W. Goss, University of Nebraska.

The following were continued as chairmen of Research Committees:

Cultural and Storage: E. V. Hardenburg, Cornell University.

Potato Breeding: C. F. Clark, U. S. Department of Agriculture.

Fertilizer Investigations: Ora Smith, Cornell University.

Virus Diseases: T. P. Dykstra, U. S. Department of Agriculture.

Potato Insects: G. F. MacLeod, Cornell University.

The following temporary committees were appointed to serve throughout the meetings:

Auditing Committee: Fred H. Bateman, Paul Mott, and K. W. Lauer.

Nominating Committee: Karl Fernow, H. R. Talmadge, and Harold Bailey.

Resolutions Committee: L. T. Denniston, and Daniel Dean.

Report of the Secretary-Treasurer-Editor

The association started the year 1936 with eight hundred and twelve members and ended it with one thousand one hundred fourteen, a net gain of three hundred and two. In this connection, it is interesting to note that there were only three hundred twenty-two members in 1933. The increased membership in 1936 was secured largely through the cooperation of Maine and Minnesota; the former state sent in one hundred twenty-five members and the latter, through the cooperation of A. G. Tolaas, recently sent in one hundred members. New Jersey has the largest membership in the association, followed by Maine, New York, Minnesota and Washington.

There is more interest in the Journal now than at any previous time. Numerous requests are being received from libraries for back numbers and foreign subscriptions are increasing. This past year, twenty-eight were received from Canada and forty-nine from foreign countries.

This year the Journal contained four hundred and forty pages, including three hundred and sixty-two of printed matter and the remaining, advertising. There has been a very marked improvement in the quality of manuscripts submitted this year. We appreciate the cooperation of the contributors of both manuscripts and sectional notes. The latter have improved over previous years but there is room for further improvement, particularly in the manner of having them represent the conditions of the industry in the different states. The Editor is again indebted to Dr. E. S. Clark for her assistance in editing the Journal. Without her aid, it would be necessary to relinquish the task.

It is gratifying to report that, with the assistance of a W.P.A. project, it has been possible to prepare an index of the American Potato Journal to date. As soon as sufficient funds are available, this will be printed and placed in the hands of the members.

Statement of accounts for the year ending December 20, 1936:

Receipts:		
Balance from Dec. 20, 1935		$1.54
Annual Dues		1119.12
Sales of Advertising		1315.04
Reprint Receipts		158.75
Miscellaneous		27.91
Received from Michigan Bank on Acct.		14.57
Total Receipts		$2636.93
Expenditures:		
Printing and Mailing of Journals (Nov., 1935 to Oct., 1936, Incl.)		1457.23
Reprints		148.85
Miscellaneous		35.45
Secretarial Work		490.00
Stenographic Services		184.60
Stamps and Supplies		245.26
Total Expenditures		$2561.39
Bank Bal. December 21	$75.54	
Accounts Receivable:		
Sale of Advertising	75.00	
Reprints and Miscellaneous	29.33	
Michigan Bank	131.06	
	$235.39	

Report of the Auditing Committee

We, the undersigned Auditing Committee, have examined the books of the Potato Association of America and have found them to be in good order.

FRED H. BATEMAN, *Chairman*
PAUL MOTT
K. W. LAUER

Report of the Committee on Resolutions

The American Potato Association appreciates and wishes to thank the American Association for the Advancement of Science for its cooperation and many courtesies in arranging for the annual meeting of the Association at the Atlantic City convention.

Whereas, the breeding and introduction of large numbers of new potato varieties between 1850 and 1905 was of unusual value to the industry, and

Whereas, few new varieties have been introduced since 1905, and

Whereas, the diversity of soils, climate, markets, etc., renders desirable the breeding of new varieties to meet special local conditions,

Be it resolved that the Potato Association of America commend the work of the members of the United States Department of Agriculture and that done by workers in a few individual states, and recommend that these efforts be continued.

In order to further the development of new varieties, we recommend that the Association encourage renewed efforts within the several states toward the development of varieties more peculiarly adapted to the different producing areas or regions.

We further recommend that the United States Department of Agriculture make it possible to maintain supplies of breeding stock not in commercial production to be available to the potato breeders.

DANIEL DEAN, New York
L. T. DENNISTON, Pennsylvania

Report of the Committee on Potato Improvement

This Committee was appointed to stimulate interest in the national program and in general to further the work in any way possible.

The Committee has cooperated informally with a similar committee of the American Phytopathological Society and with the workers of the U. S. Department of Agriculture, who are heading up this program.

Although the Committee has not undertaken any definite concrete piece of work, it does feel that a great deal has been accomplished in aiding this program. During the past year the administrative officers of the State Experiment Stations have been made more familiar with this program, and their interest and support have been evidenced by the inereased number of cooperative projects and the allocation of funds for the work. The cooperation of horticulturists, breeders, and pathologists was evidenced by the attendance and interest at the summer meeting held in Minnesota in August. The survey being made by the Department of Agriculture on all the potato projects undertaken in the United States will provide a great fund of information that will be of value to both old and new cooperators.

In general, the Committee feels that during the past year there has been a renewed interest in this program as indicated by the expansion of the program, the greater cooperation of pathologists, horticulturists, and breeders, and the greater coordination of the work by the program leaders.

If this Committee is to be continued, the Chairman would like to be relieved of his duties and recommends that a horticulturist be appointed in his place.

R. W. Goss, *Chairman*
J. R. Livermore
F. M. Harrington
Julian Miller

Note—The discussion of the plan for marketing Pennsylvania potatoes which appeared in the October issue of the Journal was taken from an article which appeared in THE GUIDE POST, published by the Pennsylvania Potato Grower's Association.

REVIEW OF RECENT LITERATURE

An economic study of the potato enterprise in Michigan. P. F. AYLESWORTH. (*Mich. Agr. Exp. Sta. Spec. Bul.* 267 (1935), *pp.* 1-42).

Table stock producers had a total growing and harvesting cost to the acre of $13.22, a yield of 126 bushels to the acre and a cost of 34 cents to the bushel for field run potatoes at the farm. They obtained an average of 10.2 acres of potatoes on each farm, used 12 bushels of seed and 97 pounds of fertilizer to the acre and sprayed an average of 2.3 times. They spent 56 hours of man labor, 45 hours of horse labor, and 1.9 hours of tractor use in producing an acre of potatoes.

Man labor constituted 23 per cent; power and machinery 23; manure and fertilizer 20; seed 16; use of land 8; spray and treating material 3; and other costs the remaining 7 per cent of the total cost of producing table stock potatoes.

The average acre cost for the certified seed producers was $82.81, the yield 241 bushels, and the cost for each bushel 34 cents for field run potatoes at the farm. They obtained an average of 8 acres of potatoes on each farm. They used 20 bushels of seed and 380 pounds of fertilizer to the acre and sprayed an average of 5.6 times. They spent 95 hours of man labor; 54 hours of horse labor; and 4.5 hours of tractor use in producing an acre of potatoes.

Seed constituted 22 per cent; man labor 21; power and machinery 21; manure and fertilizer 16; spray and treating material 6; certification and inspection 4; use of land 4 and other costs, the remaining 6 per cent of the total cost of producing certified seed potatoes. Cash costs were $39.52 to the acre for certified seed producers, and only $13.11 for table stock producers.

Growers who followed over 75 per cent of the good practices obtained from 150 to 200 per cent greater yields and also lower costs to the bushel than the growers who followed less than 25 per cent of these practices.

Production costs must be kept low, perhaps below 40 cents to the bushel, in order that the grower might realize a profit. In order to do this, yields must be kept above 150 bushels to each acre. Obtaining this yield means: (1) Growing potatoes on soils and in regions adapted to their production; (2) planting good quality seed; (3) planting early for quality potatoes; (4) spacing 12 to 16 inches in the row; (5) using proper amounts of the correct fertilizer; (6) being efficient in the use of labor, power and machinery.—ORA SMITH.

660 BUSHELS PER ACRE

Fort Fairfield, Me.
October 10, 1936.

We just finished digging the field where you took photographs and are very glad to report that this is the best crop we ever raised. The yield was 220 12-peck barrels per acre, which is equivalent to 240 11-peck barrels, or 660 bushels to the acre.

These were State Certified Green Mountains, and we believe this to be the heaviest yield of this variety harvested in the State this year.

This crop was grown with Armour's Fertilizer, which we have used continuously since 1916 when we started business. Our father, Philo H. Reed, began using your goods when you first did business in Maine in 1905, so that your fertilizers have been used continuously for 31 years by our family.

We raised 1335 acres of Certified Seed potatoes this year. According to the Maine bulletin, this is the largest acreage of Certified Seed produced by any one grower.

(Signed) REED BROS., INC.
Walter M. Reed, Treas.

That letter well expresses why so many successful growers always use Armour's. Especially balanced for potato growing, Armour's Big Crop produces quality and yield, year after year. See your nearest Armour agent for your supply.

Armour Fertilizer Works

120 Broadway, New York City
Presque Isle, Me.
Baltimore, Md.

Armour's BIG CROP FERTILIZERS

ARMOUR'S ACTIVE PLANT FOODS

American Potato Journal

PUBLISHED BY

THE POTATO ASSOCIATION OF AMERICA

SOMERVILLE, N. J. NEW BRUNSWICK, N. J.

AVOID OVER-PRODUCTION

The farm prices of potatoes this past year are to be reflected in increased plantings in 1937. Larger crops are almost certain to follow increased plantings. This larger crop can be expected to sell at lower prices with a corresponding reduction in the potato grower's total income. The present extremely small supply of late potatoes does, of course, make the picture much brighter than has been the case for a number of years. If the present plans in the early states are carried out the increase will be 18 per cent above the 1936 acreage. However, even with these increased plantings, there promises to be available for the first five months of this year approximately 12,000,000 bushels of potatoes less than for the same period of 1936.

The picture is, of course, a pleasing one to the potato growers. They must appreciate however, that if prices reach too high a level, consumption will continue to decrease. More particularly the growers must keep uppermost in their minds the fact that a situation of this kind has, in the past, invariably been followed by over-production and low prices. In 1932, for example, prices were extremely low. In 1933 the growers in those sections where favorable weather conditions prevailed received an income which enabled them to pay many of their bills. The next two seasons were disastrous and many growers were in so bad financial straits that it appeared to be impossible to continue. In 1936, however, the weather came to the rescue and again the growers fortunes were revived. As we contemplate our blessings of last year we should have before us the drab picture of the two preceding years. This will aid us in making plans for this year's crop. Plan carefully. Keep production costs at a minimum. Do not attempt to cash in on last year's good fortune. Conservative action on the part of the growers at the present time should lead to a continuation of fair prices. Unbridled optimism leading to over-planting is almost certain to result in low prices again.